Catch, Size, and Age of Chinook and Coho Salmon taken in the Strait of Georgia Troll Fishery in 1984 and Comparisons with 1983 Data

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ABSTRACT

Carter, E. W., L. A. Lapi, and E. A. R. Ball. 1986. Catch, size, and age of chinook and coho salmon taken in the Strait of Georgia troll fishery in 1984 and comparisons with 1983 data. Can. Tech. Rep. Fish. Aquat. Sci. 1456: 67 p.

This report presents the results of the second year of data collected through the Strait of Georgia Port Sampling program. Despite the large reduction in the 1984 troll season and only 40% of the effort expended, catch per unit effort was higher for both species in 1984. In addition, there was a decrease in the shaker/keeper ratio (lower incidence of shakers) and a dramatic increase in size for chinook between 1983 and 1984. Total interviewed catch for 1984 was 69% of the 1983 catch.

RESUME

Carter, E. W., L. A. Lapi, and E. A. R. Ball. 1986. Catch, size, and age of chinook and coho salmon taken in the Strait of Georgia troll fishery in 1984 and comparisons with 1983 data. Can. Tech. Rep. Fish. Aquat. Sci. 1456: 67 p.

On trouvera au présent rapport les résultats de la deuxième année de cueillette de données effectuée pour tout le détroit de Géorgie dans le cadre du programme d'échantillonnage aux ports. En dépit d'une importante réduction de la saison de pêche à la traîne de 1984 et d'un effort de pêche limité à 40 %, les prises par unité d'effort de cette année ont été plus élevées pour les deux espèces. On a aussi noté une diminution du rapport entre les poissons remis à l'eau et les poissons conservés (moins de poissons remis à l'eau) et une augmentation très importante de la taille des quinnats par rapport à 1983. Le nombre total des prises ayant fait l'objet de l'enquête de 1984 correspondait à 69 % de celui de 1983.

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INTRODUCTION

Since the Strait of Georgia port sampling program began in 1983 and two years of data collection are complete, a chance to compare results between years is now possible. The objectives of the 1984 program remained the same as in 1983, to obtain interviews from 30 percent of the fishermen making landings and to sample 7 to 10 percent of the total catch for biological characteristics.

Some changes that took place in the 1984 season included the large reduction in the fishing season which was cut from a 5.5-month season (April 15-September 30) to a two-month season (July 1-August 30). This change will present some difficulties in comparing the data between the two years of collection since, in the past, the troll fleet have followed a seasonal south to north migration of coho and age three chinook (Argue & Marshall 1976; Argue, Marshall & Coursley 1977) whereas in this season that migration would be farther along at the time of opening. Consequently, vessels which might normally have started fishing in the southern areas, would likely start this season fishing farther north.

This report is a summary of the 1984 Strait of Georgia[1] troll fishery. Presented are summaries of the interview data including catch per unit effort (CPUE - number of fish/hour) by area over time, number of shakers and keepers, and summaries of the biological data including length, weight, and age by flesh color and area over time. Data presented in this report are based only on interview information and not on information collected from sales slips.

METHODS

SAMPLING

Due to the shortness of the troll season and expected concentration of effort in the northern areas, port samplers were stationed in teams of two at Campbell River and Courtenay, while one other team covered the Nanaimo, French Creek, and Deep Bay sampling locations (Fig. 1). In two locations, Nanaimo and Campbell River, experienced samplers were used which assisted in the continuity of data collection. However, all samplers adhered to procedures outlined in the 1983 report (Carter et al. 1985) and in the sampling manual issued to each person (Appendix A).

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[1]Unless noted otherwise, Strait of Georgia, in this report includes areas 13, 14, 16, 17, 18 and 29AB.

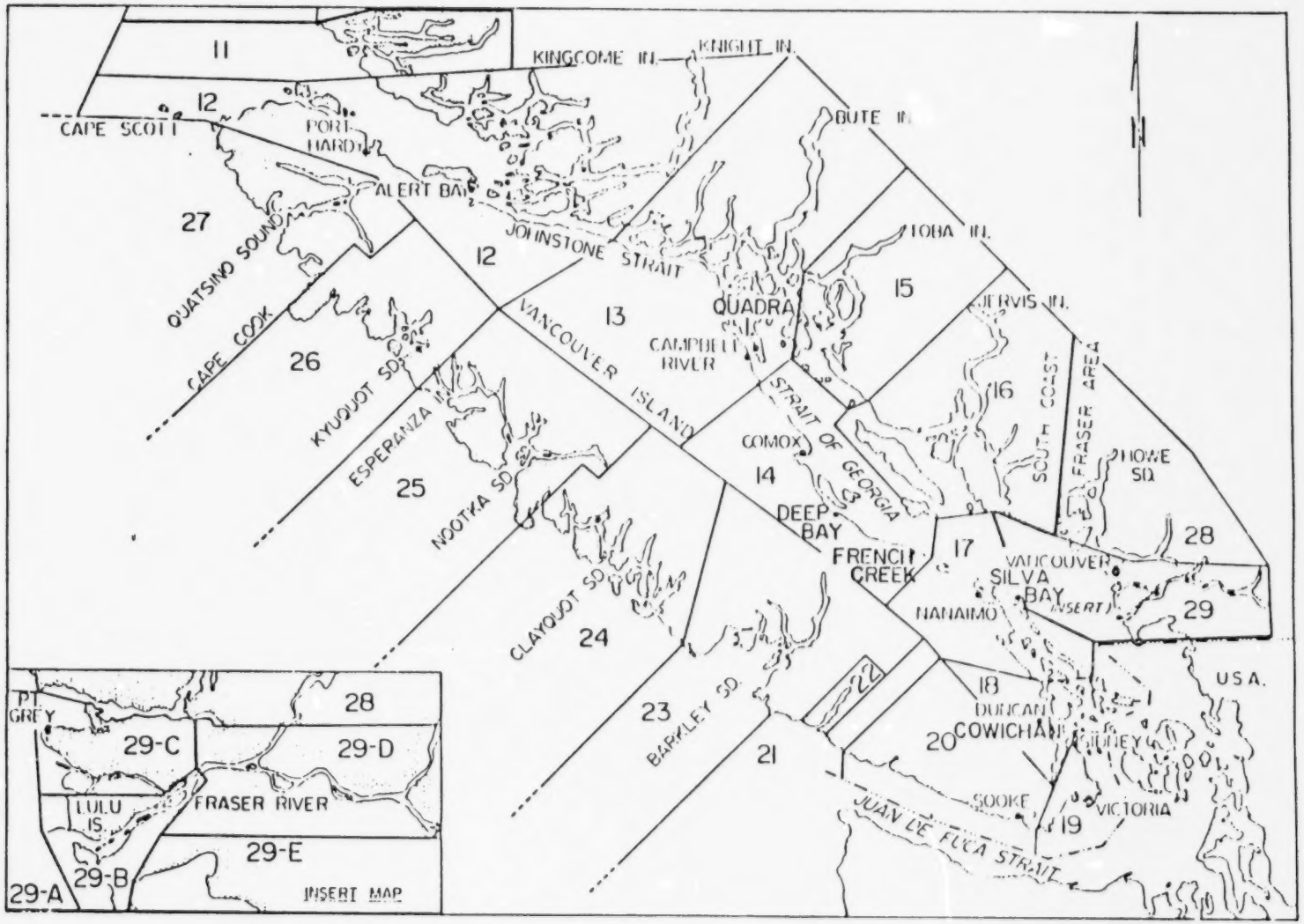


Fig. 1. Statistical areas and sampling locations for the 1984 Port Sampling Program.

The primary objective was to interview individual troll vessel skippers as they landed their catches, with a brief series of questions regarding time and areas fished, amount of gear run, catches, and discards (undersize salmon and illegal fish). This information was used in the calculation of catch per unit effort (CPUE - number of fish/hour) by area over time throughout the season.

The secondary objective was to sample each troller's catch (100% if possible) for fork length (tip of snout to fork in tail), dressed weight (head on) using portable "dairy scales", flesh color, and a scale sample (two scales) from the preferred area on each fish (Fig. 2). Since the fish were dressed (cleaned and gutted) prior to landing, no sex determination was possible. When time did not allow a total sample to be taken, samplers were instructed to select larger grades of fish which represented more age classes. This information will provide estimates of length, weight, and age composition of the catch. For seasonal summaries of length/frequency, mean weight, and age composition, the partial (non-random) catches have been excluded, using only total catch samples.

DATA PROCESSING AND ANALYSIS

Data were picked up once a week, sorted, checked for obvious errors, and photo-copies were sent out for keypunching. These were received on tape after one week and all the data were then proofed against the raw data and errors corrected. Once complete, an edited version of both interview and biological sample data were put onto magnetic tape for permanent storage.

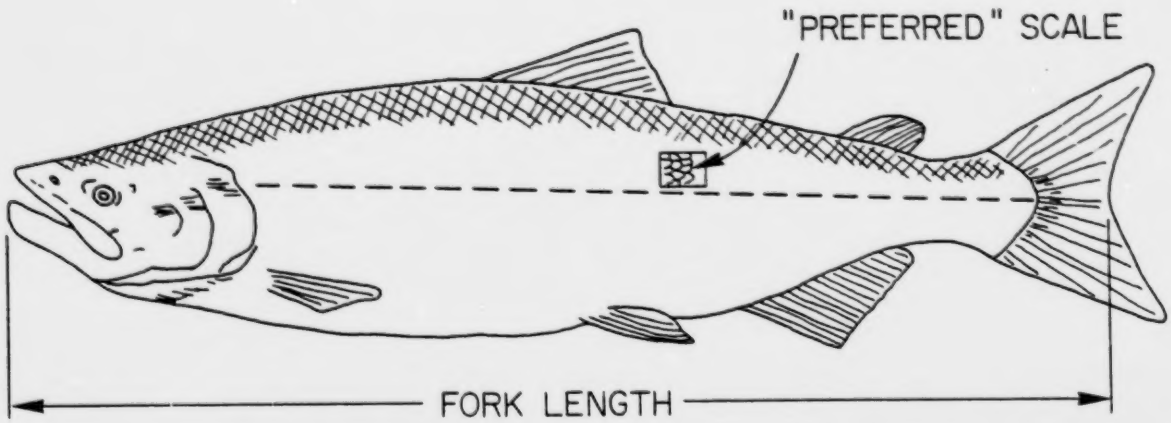
Chinook ages were determined in the ageing lab at the Pacific Biological Station using "preferred" scales. The ageing criteria used were based on scales from coded-wire tagged (known-age) fish caught in the commercial fishery.

Computer programs established in 1983 were run on the 1984 data and comparisons were made between years. Appendix tables B to E contain summaries of length and weight by species.

RESULTS

In the second year, as in the first, the cooperation of the fishermen determined the overall success of the program. Due to the fewer samplers this season, the objective of inverviewing 30 percent of the total landings was not met, however, a total of 1324 interviews were conducted (3279 in 1983). Table 1 gives a breakdown of number of interviews and biological samples by sampling location. Table 2 gives the catch, sample size, and percent sampled by stat area.

SCALE SELECTION AND REMOVAL



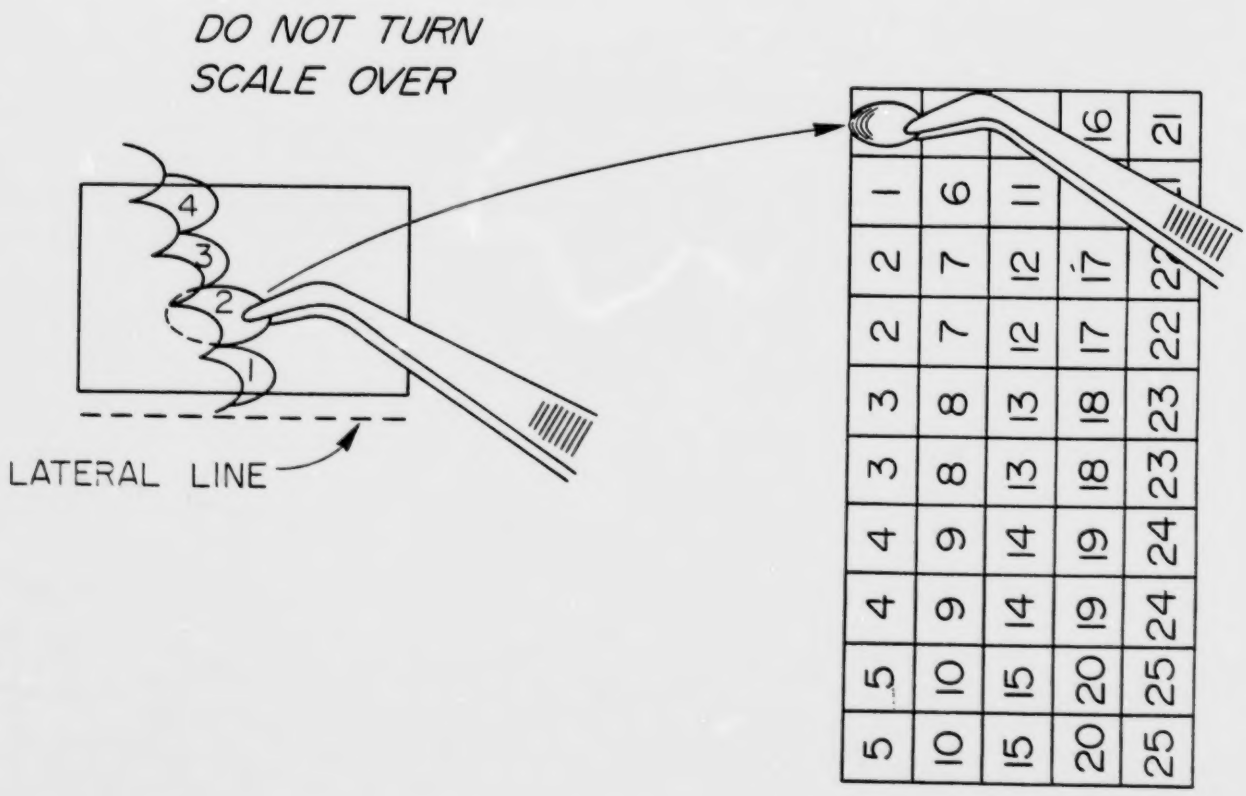


Fig. 2. Scale selection and removal.

Table 1. Number of interviews and biological samples by sampling location for Strait of Georgia port sampling program.

Sampling location	Number of interviews	Number of fish sampled	
		Coho	Chinook
Campbell River	223	596	1530
Comox	439	1244	549
Deep Bay	165	530	153
French Creek	369	306	106
Nanaimo	128	37	184
Total	1324	2713	2522

Table 2. Catch, sample size, and percent sampled by statistical area for 1984 Strait of Georgia troll-caught chinook and coho.

Month	Statistical Area 13	14	16	17	29	Total
			Chinook			
July						
Catch	29785	29123	1298	12840	612	73658
Sample	1402	583	12	184	1	2182
Percent	4.71	2.00	0.92	1.43	0.16	2.96
August						
Catch	2781	2071	360	737	438	6387
Sample	128	204	0	0	0	332
Percent	4.60	9.85	0	0	0	5.20
Total						
Catch	32566	31194	1658	13577	1050	80045
Sample	1530	787	12	184	1	2514
Percent	4.70	2.52	0.72	1.36	0.10	3.14

Month	Statistical Area 13	14	16	17	29	Total
			Coho			
July						
Catch	14082	45900	645	4822	752	66201
Sample	526	1560	1	37	0	2124
Percent	3.74	3.40	0.16	0.77	0	3.21
August						
Catch	2352	5424	272	553	480	9081
Sample	70	519	0	0	0	589
Percent	2.98	9.57	0	0	0	6.49
Total						
Catch	16434	51324	917	5375	1232	75282
Sample	596	2079	1	37	0	2713
Percent	3.63	4.05	0.11	0.69	0	3.60

[1] Catch for Can. Dept. of Fisheries and Oceans B.C. Catch Statistics 1984.

The total number of biological samples for coho was 2713 and 2522 chinook, which fell below the 7 percent goal but was nonetheless a good representative sample making up 3.6 percent of the total coho catch of 75,282 pieces and 3.1 percent of the total chinook catch of 80,045 pieces in the Strait of Georgia troll fishery. Of the total 2522 chinook sampled, 62 percent (1562) provided scales which were suitable for ageing.

Catch per Unit Effort (CPUE)

Table 3 and Figures 3 to 5 summarize the CPUE for chinook and coho. The total chinook catch from combined areas in July made up 87 percent of the total catch for the species. A drastic reduction in CPUE is evident in all areas between July and August, particularly for chinook, where the CPUE went from 1.77 in July to 0.66 in August. The drop in CPUE for coho was less dramatic going from 2.27 in July to 1.42 in August. The CPUE was higher in the northern Strait of Georgia (Areas 13, 14, 16) than in the southern Strait (Areas 17, 18, 29) as suggested earlier due to the movement of fish into the northern areas through the fishing season and the late start to the 1984 fishing season.

When compared to 1983, the CPUE for both chinook and coho was much higher in 1984. Table 4 illustrates the difference in CPUE between the two years.

Considering the fishing season was reduced by 37 percent from the 1983 season, catches were very high in 1984 making up 69 percent of the total 1983 catch of chinook and exceeding the 1983 catch of coho by 13 percent.

Number of Shakers and Keepers

The shaker/keeper ratio for chinook increased and at least doubled between July and August in all areas but area 16 where the increase was 13 percent (Table 5; Fig. 6). In combined areas the ratio went from 0.52 in July to 1.35 in August. The ratio was lower in the north (0.60) than in the south (1.05) even though the catch in the north was 90 percent of the total catch. The combined-area season total ratio was 0.63 which, because of the high catch, reflects mainly the picture in the north.

The situation for coho was similar to that of chinook, generally showing even greater increases in shakers in August (Table 5; Fig. 6). There is difficulty in trying to compare between north and south since there was very little information collected on coho from the south. The combined area ratio increased from 0.07 in July to 0.58 in August with the season's ratio at 0.17.

Comparing to the 1983 data, the 1984 shaker/keeper ratio for chinook was lower in the north (1983 - 0.81, 1984 - 0.60) and higher in the south (1983 - 0.69, 1984 - 1.05). The coho shaker/keeper ratio was lower in both north and south in 1984 at 0.17 while in 1983 the north had a ratio of 0.31 and the south 0.74 (Table 6).

Table 3. Catch per unit effort (CPUE) by statistical area and month for 1984 Strait of Georgia troll-caught chinook and coho.

Month	Statistical Area 13	14	16	17	18	29	Total
			Chinook				
July							
Catch	2438	9659	1344	926	0	4	14371
Effort	1255.50	5762.00	466.00	481.00	16.00	116.50	8097.00
CPUE	1.94	1.68	2.88	1.93	0	0.03	1.77
August							
Catch	651	1440	69	12	1	3	2176
Effort	714.50	1805.50	70.00	30.00	46.00	632.50	3298.50
CPUE	0.91	0.80	0.99	0.40	0.02	0.00	0.66
Total							
Catch	3089	11099	1413	938	1	7	16547
Effort	1970.00	7567.50	536.00	511.00	62.00	749.00	11395.50
CPUE	1.57	1.47	2.64	1.84	0.02	0.01	1.45

Month	Statistical Area 13	14	16	17	18	29	Total
			Coho				
July							
Catch	959	16297	735	389	0	5	18385
Effort	1255.50	5762.00	466.00	481.00	16.00	116.50	8097.00
CPUE	0.76	2.83	1.58	0.81	0.00	0.04	2.27
August							
Catch	387	4222	10	32	0	22	4673
Effort	714.50	1805.50	70.00	30.00	46.00	632.50	3298.50
CPUE	0.54	2.34	0.14	1.07	0.00	0.03	1.42
Total							
Catch	1346	20519	745	421	0	27	23058
Effort	1970.00	7567.50	536.00	511.00	62.00	749.00	11395.50
CPUE	0.68	2.71	1.39	0.82	0.00	0.04	2.02

[1] Catch from Can. Dept. of Fisheries and Oceans B.C. Catch Statistics 1984.

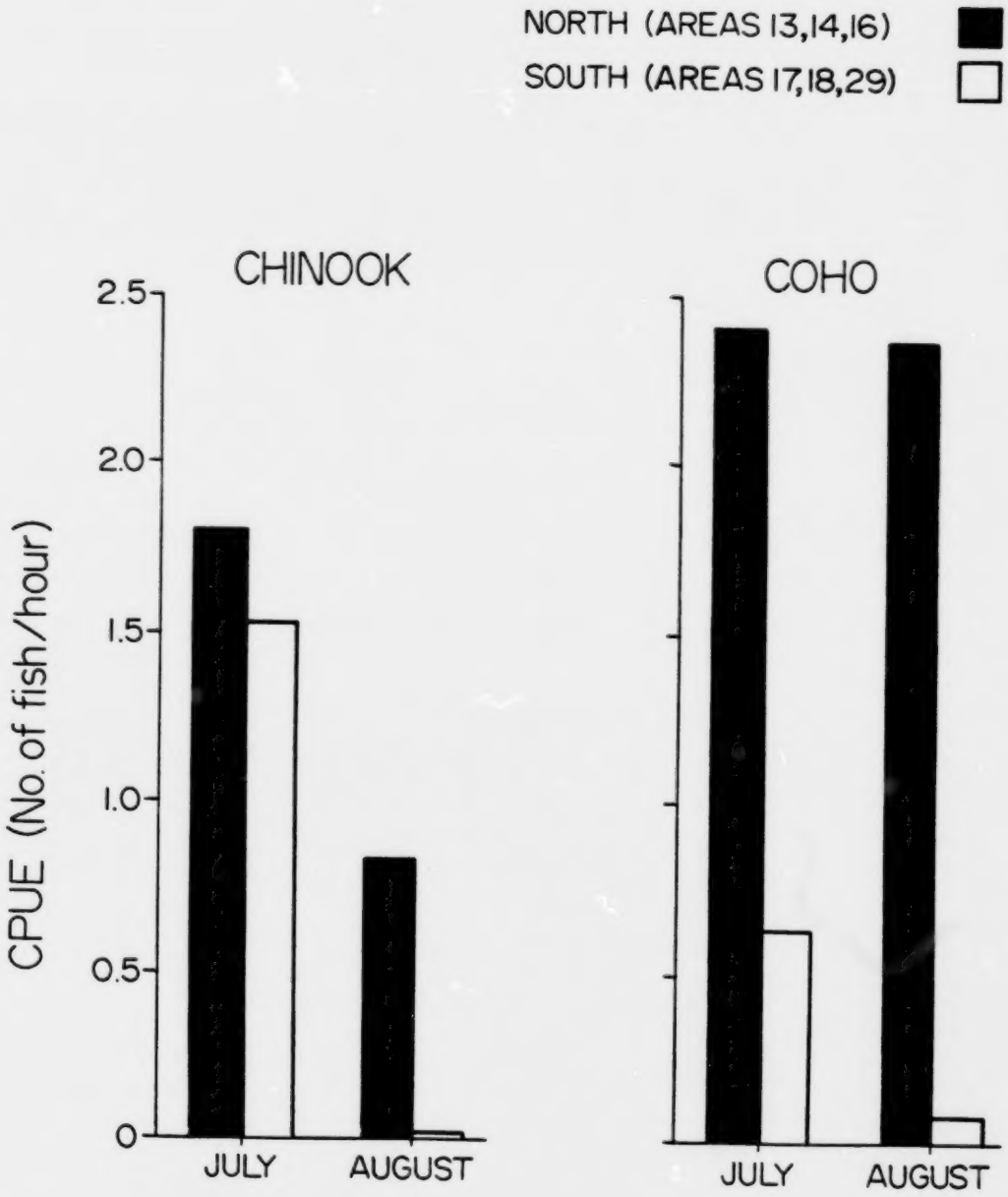


Fig. 3. Catch per unit effort in North and South Strait of Georgia for 1984 troll-caught chinook and coho.

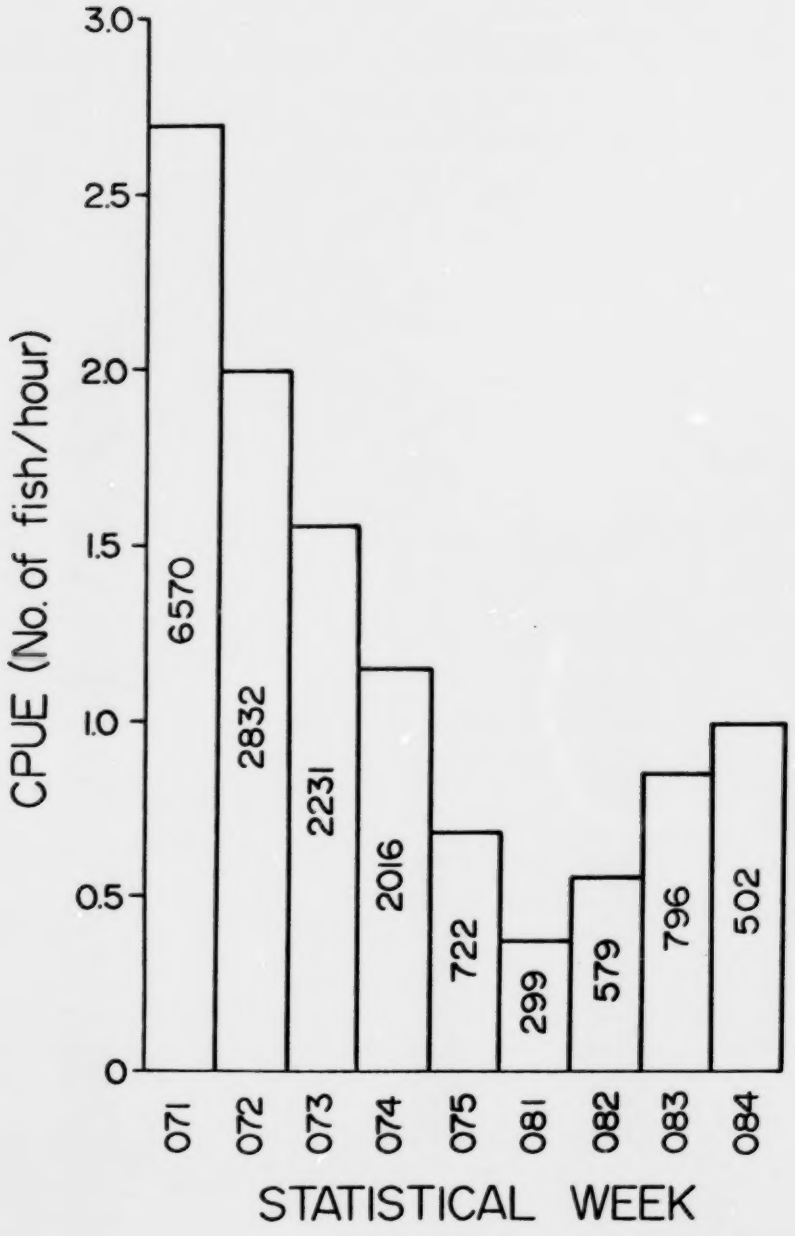


Fig. 4. Catch per unit effort of chinook by week for combined areas during the 1984 Strait of Georgia troll season.

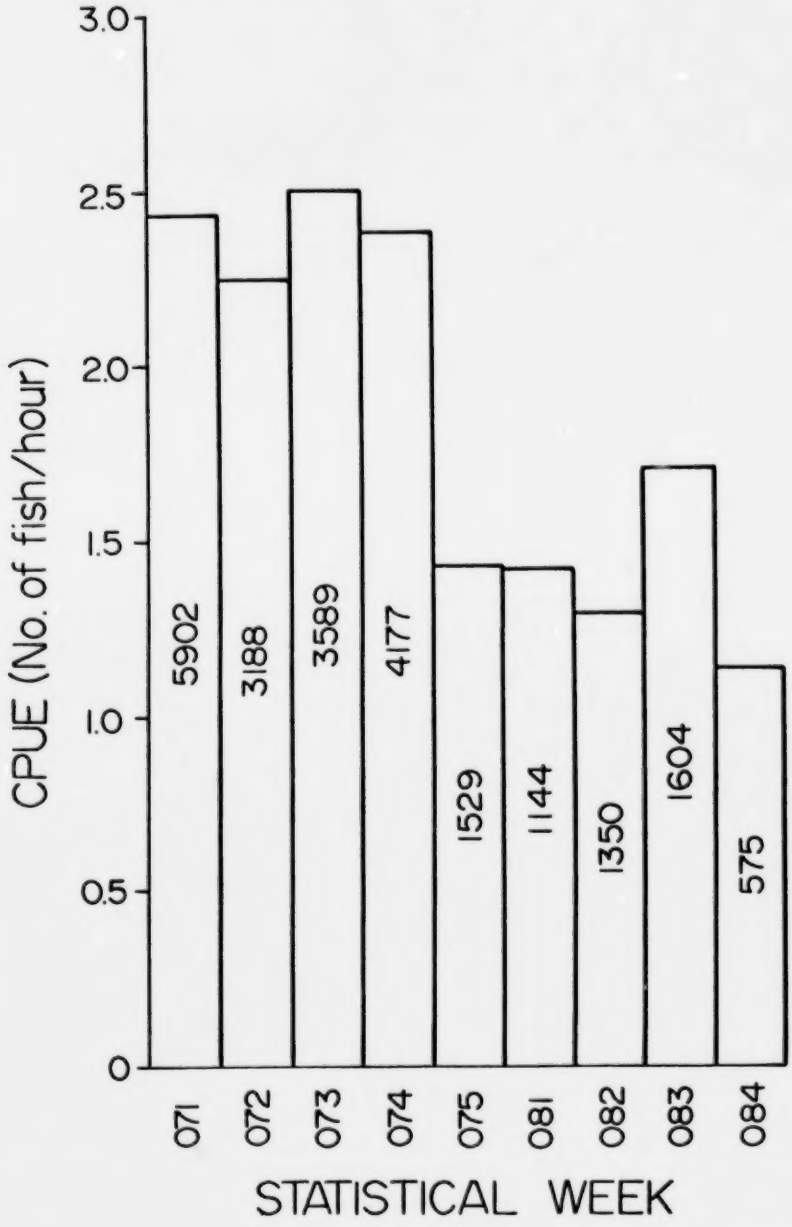


Fig. 5. Catch per unit effort of coho by week for combined areas during the 1984 Strait of Georgia troll season.

Table 4. Catch per unit effort comparison of 1983 and 1984 troll-caught chinook and coho.

Year	Chinook North (Areas 13,14,16)	Chinook South (Areas 17,18,29)	Chinook Total
1983			
Catch	18237	5707	23944
Effort	23486.0	5467.5	28953.5
CPUE	0.78	1.04	0.83
1984			
Catch	15601	946	16547
Effort	10073.5	1322	11395.5
CPUE	1.55	1.26	1.45

Year	Coho North (Areas 13,14,16)	Coho South (Areas 17,18,29)	Coho Total
1983			
Catch	19674	738	20412
Effort	12620.0	2233.3	14853.3
CPUE	1.56	0.33	1.37
1984			
Catch	22610	448	23058
Effort	10073.5	1322.0	11395.5
CPUE	2.24	0.34	2.02

Table 5. Number of shakers and keepers by statistical area and month for 1984 Strait of Georgia troll-caught chinook and coho.

Month	Statistical Area 13	14	16	17	18	29	Total
			Chinook				
July							
Shakers	383	5980	447	581	6	37	7434
Keepers	2438	9659	1344	926	0	4	14371
Ratio	0.16	0.62	0.33	0.63	-	9.25	0.52
August							
Shakers	461	2068	32	28	6	333	2928
Keepers	651	1440	69	12	1	3	2176
Ratio	0.71	1.44	0.46	2.33	6.00	111.00	1.35
Total							
Shakers	844	8048	479	609	12	370	10362
Keepers	3089	11099	1413	938	1	7	16547
Ratio	0.27	0.73	0.34	0.65	12.00	52.86	0.63

Month	Statistical Area 13	14	16	17	18	29	Total
			Coho				
July							
Shakers	44	996	197	2	6	0	1245
Keepers	959	16297	735	389	0	5	18385
Ratio	0.05	0.06	0.27	0.01	-	-	0.07
August							
Shakers	230	2412	2	20	18	29	2711
Keepers	387	4222	10	32	0	22	4673
Ratio	0.59	0.57	0.20	0.63	-	1.32	0.58
Total							
Shakers	274	3408	199	22	24	29	3956
Keepers	1346	20519	745	421	0	27	23058
Ratio	0.20	0.17	0.27	0.05	-	1.07	0.17

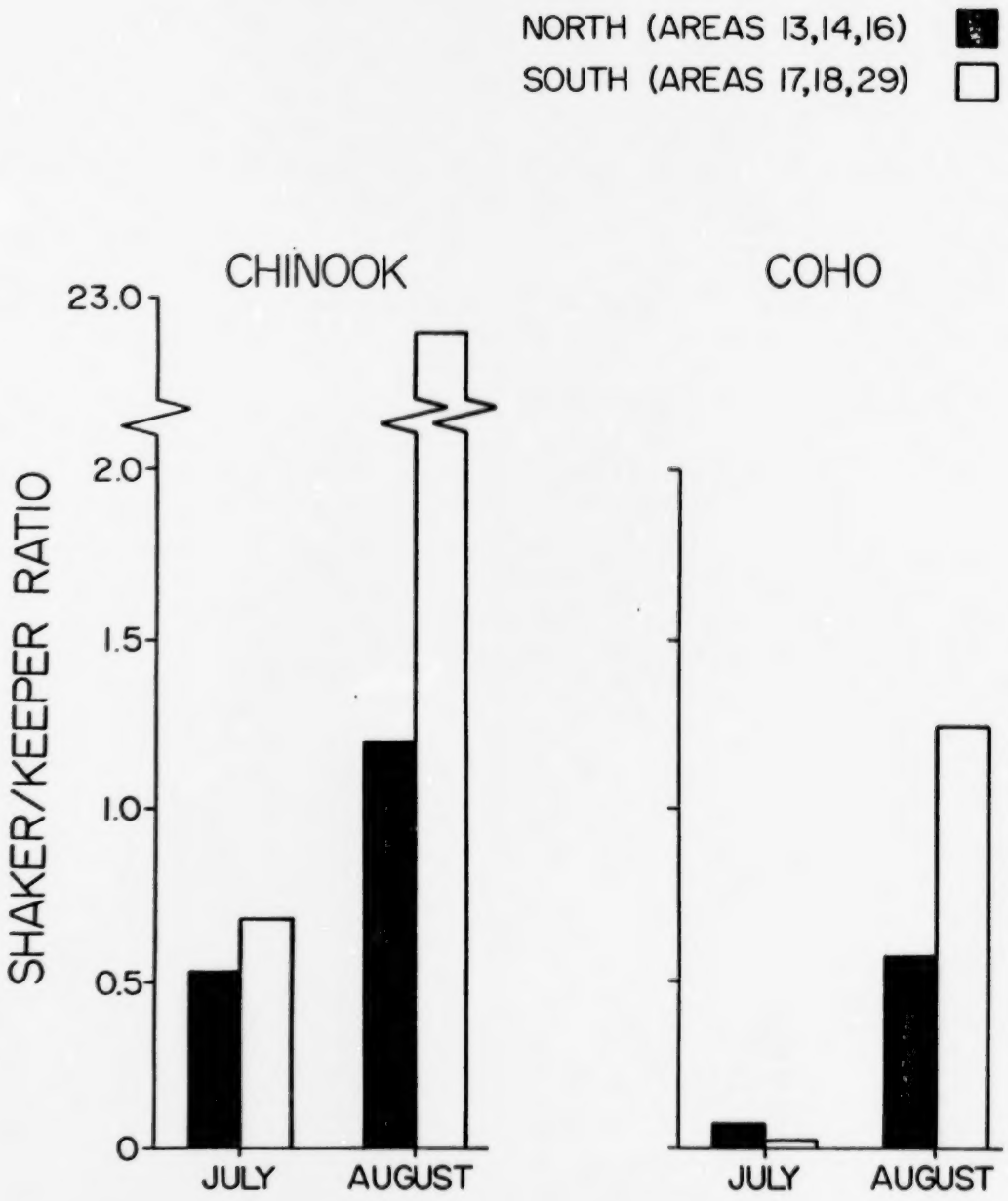


Fig. 6. Shaker/keeper ratio in North and South Strait of Georgia for 1984 troll-caught chinook and coho.

Table 6. Shaker/keeper comparison of 1983 and 1984 Strait of Georgia troll-caught chinook and coho.

Year	North (Areas 13,14,16)	South (Areas 17,18,29)	Total
	Chinook		
1983			
Shakers	14824	3911	18735
Keepers	18237	5707	23944
Ratio	0.81	0.69	0.78
1984			
Shakers	9371	991	10362
Keepers	15601	946	16547
Ratio	0.60	1.05	0.63

Year	North (Areas 13,14,16)	South (Areas 17,18,29)	Total
	Coho		
1983			
Shakers	6113	543	6656
Keepers	19674	738	20412
Ratio	0.31	0.74	0.33
1984			
Shakers	3881	75	3956
Keepers	22610	448	23058
Ratio	0.17	0.17	0.17

SIZE COMPOSITION OF CHINOOK

Length/Weight/Color

The mean length and weight of white chinook was greater than red in all areas throughout the season (Table 7; Fig. 7). The combined-area mean length for whites was 695 mm and for reds 622 mm while the mean weights were 3.91 kg for whites and 2.75 kg for reds (Table 8; Fig. 8). A comparison between the northern and southern areas is difficult due to the small sample size in the south, however, the data indicate that the northern fish were larger for both red and white.

The means for both colors indicate a substantial increase in size from 1983 to 1984. The mean length for whites increased by 8.4% (1983 - 641 mm, 1984 - 695 mm) and for reds the increase was 4.4% (1983 - 596 mm, 1984 - 622 mm). Mean weights showed an even greater increase for whites at 31.1% (1983 - 3.08, 1984 - 4.04) and a 11.8% increase for reds (1983 - 2.46, 1984 - 2.75).

The percentage of reds in 1984 followed the trend set in 1983 and was consistently higher than whites in all areas (Table 7). The combined-area percentage was 80% reds and 20% whites. This represents an increase of 18% in the occurrance of reds from 1983 (62% red, 38% white). A comparison of percent color in areas 13 and 14 between the 1984 Port Sampling data and B.C. catch statistics is given in Table 9.

SIZE COMPOSITION OF COHO

Length/Weight

The combined-area mean length for coho in 1984 was 529 mm and mean weight was 1.48 kg (Tables 7 and 8; Figs. 7 and 8). Again, due to the small sample size in the southern areas, no real comparison can be made between the north and south. A 4.3% decrease in mean length and a 4.2% increase in mean weight occurred between 1983 and 1984 (1983 - 552 mm, 1.42 kg).

AGE COMPOSITION OF CHINOOK

As mentioned, chinook ages were determined using preferred scales and criteria were based on scales from known-age fish. Since the chinook from this program were ocean-caught, little or no scale resorption would have occurred. Therefore, the use of fin ray sections used in the spawning salmon ageing study (Chilton and Bilton 1985) would not be necessary.

In all areas throughout the season, the age 3 chinook (0.2) comprised the largest percentage of the catch. As the season progressed, a slightly lower percentage of 3-year olds and higher percentage of 2-year olds

Table 7. Mean fork length (mm) and percent color by month and area for 1984 Strait of Georgia troll-caught chinook and coho.

Month		Statistical Area 13 Red	13 White	14 Red	14 White	16 Red	16 White	17 Red	17 White	29 Red	29 White	Total[a] Red	Total[a] White
						Chinook							
July	n	902	271	474	109	11	1	135	49	1	-	1523	430
	$\bar{x}$	650	730	626	674	727	763	610	691	483		640	711
	%	77	23	81	19	92	8	73	27	100		78	22
August	n	274	83	164	40	-	-	-	-	-	-	438	123
	$\bar{x}$	625	714	633	689							628	706
	%	77	23	80	20							78	22
Total	n	1176	354	638	149	11	1	135	49	1	-	1961	553
	$\bar{x}$	644	726	628	678	727	763	610	691	483		637	710
	%	77	23	81	19	92	8	73	27	100		78	22
						Coho							
July	n	302		1495		-		37		-		1834	
	$\bar{x}$	542		524				495				526	
August	n	157		394		-		-		-		551	
	$\bar{x}$	560		528								537	
Total	n	459		1889		-		37		-		2385	
	$\bar{x}$	548		525				495				529	

[a]Total: This figure differs from "Number of fish sampled" (Table 1) since only total and random catch samples were used in the above calculations.

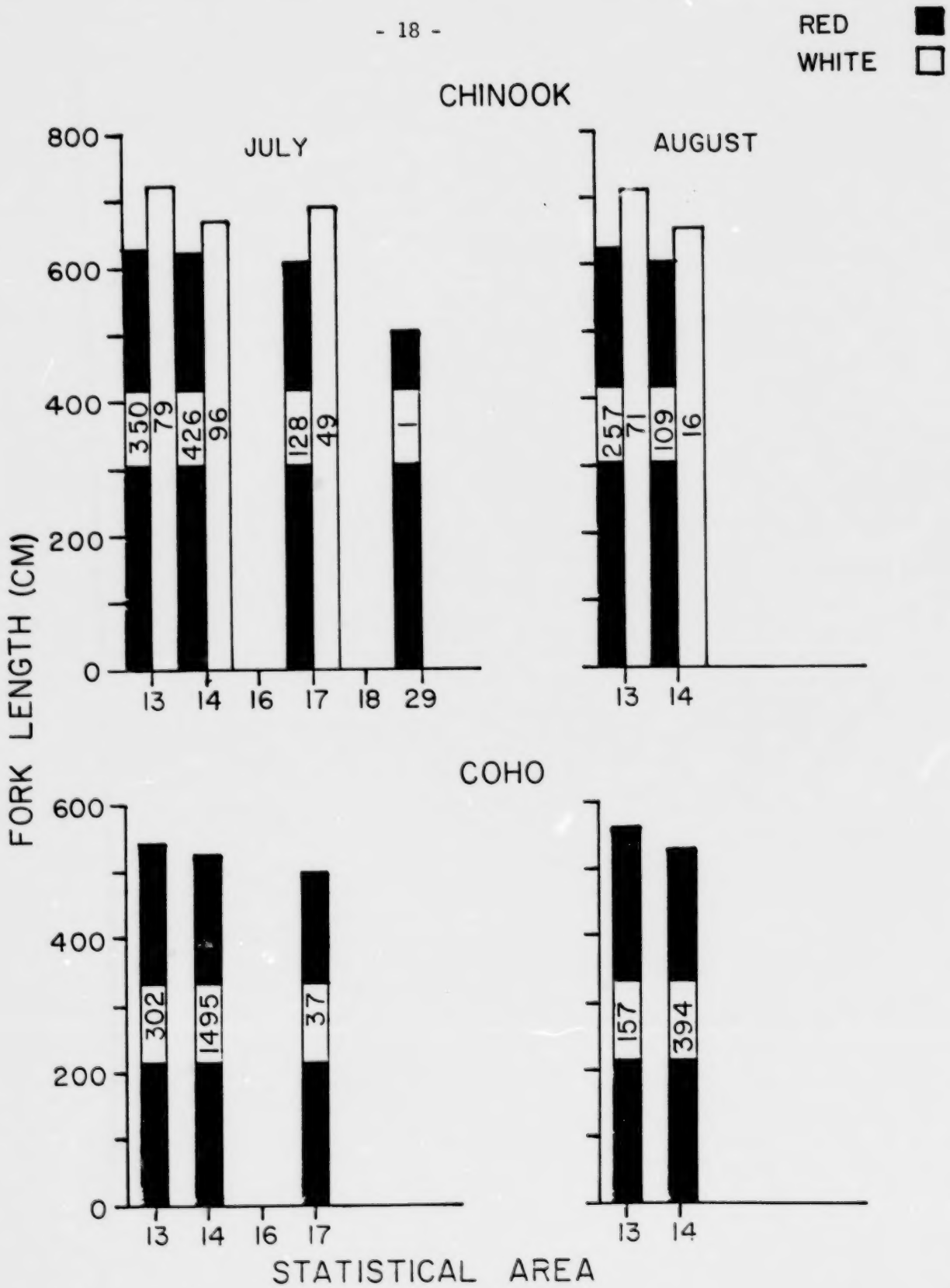


Fig. 7. Mean fork length (mm) by colour, month, and area for 1984 Strait of Georgia troll-caught chinook and coho.

Table 8. Mean weight (kg) and percent color by month and area for 1984 Strait of Georgia troll-caught chinook and coho.

Month		Statistical Area 13 Red	13 White	14 Red	14 White	16 Red	16 White	17 Red	17 White	18 Red	18 White	29 Red	29 White	Total Red	Total White
								Chinook							
July	n	350	79	426	96	-	-	128	49	-	-	1	-	905	224
	$\bar{x}$	2.80	4.31	2.74	3.51			2.86	4.05			1.4		2.78	3.91
	%	82	18	82	18			72	28			100		80	20
August	n	257	71	109	16	-	-	-	-	-	-	-	-	366	87
	$\bar{x}$	2.72	4.31	2.63	4.64									2.69	4.37
	%	78	22	87	13									81	19
Total	n	607	150	535	112	-	-	128	49	-	-	1	-	1271	311
	$\bar{x}$	2.77	4.31	2.71	3.68			2.86	4.05			1.4		2.75	4.04
	%	80	20	83	17			72	28			100		80	20
								Coho							
July	n	302		1495		-		37		-		-		1834	
	$\bar{x}$	1.45		1.42				1.28						1.42	
August	n	157		394		-		-		-		-		551	
	$\bar{x}$	1.66		1.64										1.64	
Total	n	459		1889		-		37		-		-		2385	
	$\bar{x}$	1.52		1.47				1.28						1.48	

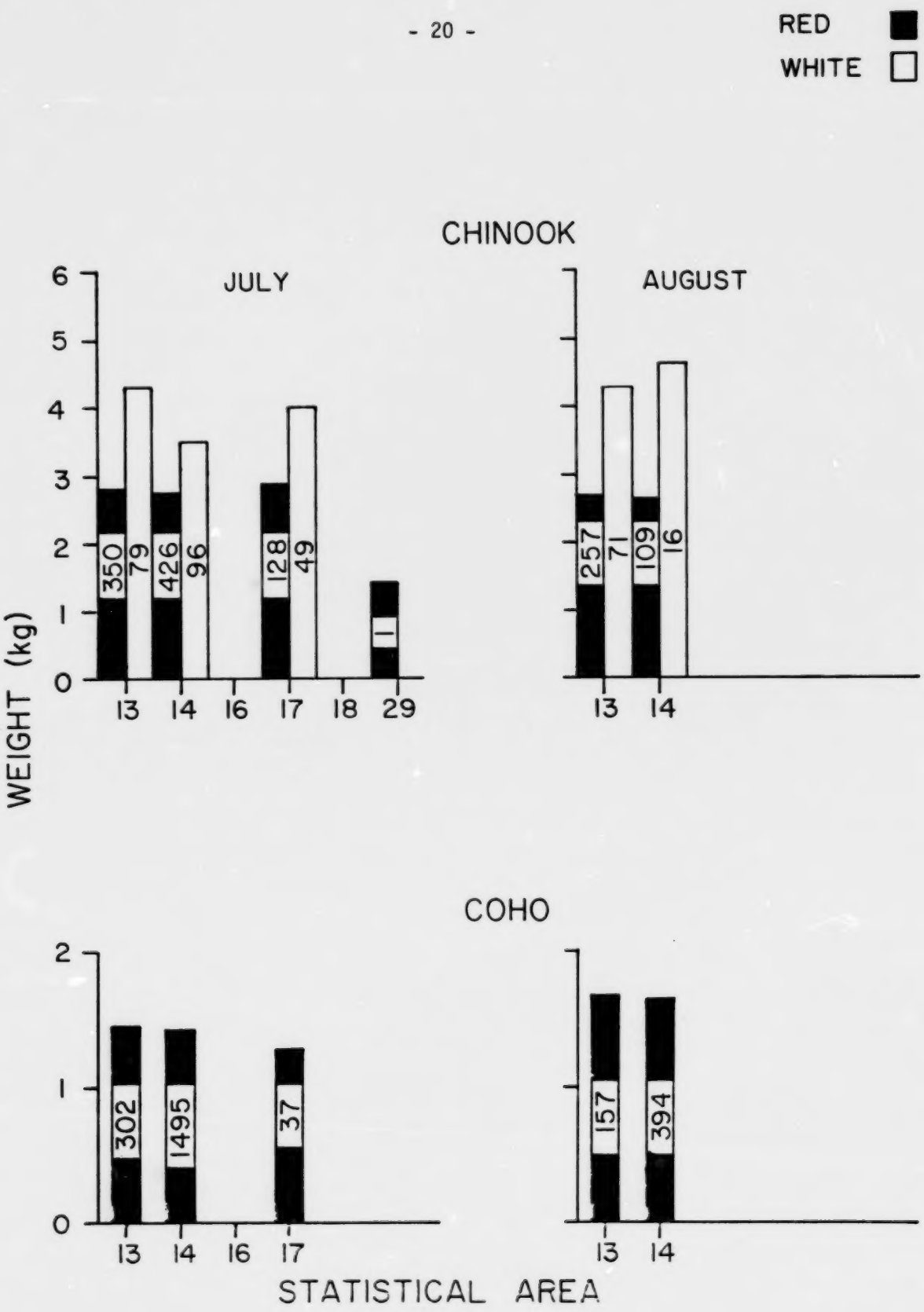


Fig. 8. Mean weight (kg) by colour, month, and area for 1984 Strait of Georgia troll-caught chinook and coho.

Table 9. Comparison of percent color for chinook between 1984 port sampling data and B.C. catch statistics[a] in Areas 13 and 14.

		Statistical Area					
		13		14		Total	
Month		Red	White	Red	White	Red	White
July	From interviews	1080	322	474	109	1554	431
	%	77	23	81	19	78	22
	From sales slips	20685	7119	19527	5131	40212	12250
	%	74	26	79	21	77	23
August	From interviews	96	32	164	40	260	72
	%	75	25	80	20	78	22
	From sales slips	3555	1027	2496	730	6051	1757
	%	78	22	77	23	77	23
Total	From interviews	1176	354	638	149	1814	503
	%	77	23	81	19	78	22
	From sales slips	24240	8146	22023	5861	46263	14007
	%	75	25	79	21	77	23

[a]From Canada Department of Fisheries & Oceans B.C. catch statistics 1984.

Table 10. Age composition[a] by month and area of 1984 Strait of Georgia troll-caught chinook.

Area	Month	Age	Catch	Percent
13	July	0.1	9	2.4
		0.2	272	73.1
		0.3	24	6.5
		0.4	1	0.3
		1.1	2	0.5
		8.0[b]	64	17.2
	August	0.1	39	10.8
		0.2	235	65.3
		0.3	16	4.4
		0.4	2	0.6
		1.1	1	0.3
		1.2	1	0.3
		8.0	66	18.3
14	July	0.1	16	3.2
		0.2	382	75.5
		0.3	18	3.5
		0.4	1	0.2
		1.1	1	0.2
		1.2	2	0.4
		8.0	86	17.0
	August	0.1	22	15.0
		0.2	102	69.4
		0.3	1	0.7
		1.1	1	0.7
		8.0	21	14.2
17	July	0.1	1	0.6
		0.2	109	61.9
		0.3	16	9.1
		0.4	1	0.6
		1.1	2	1.1
		8.0	47	26.7
29	August	8.0	1	100.0

[a]Ages used are from total and random catch samples only.

[b]8.0 = Scales unreadable or no scale sample taken.

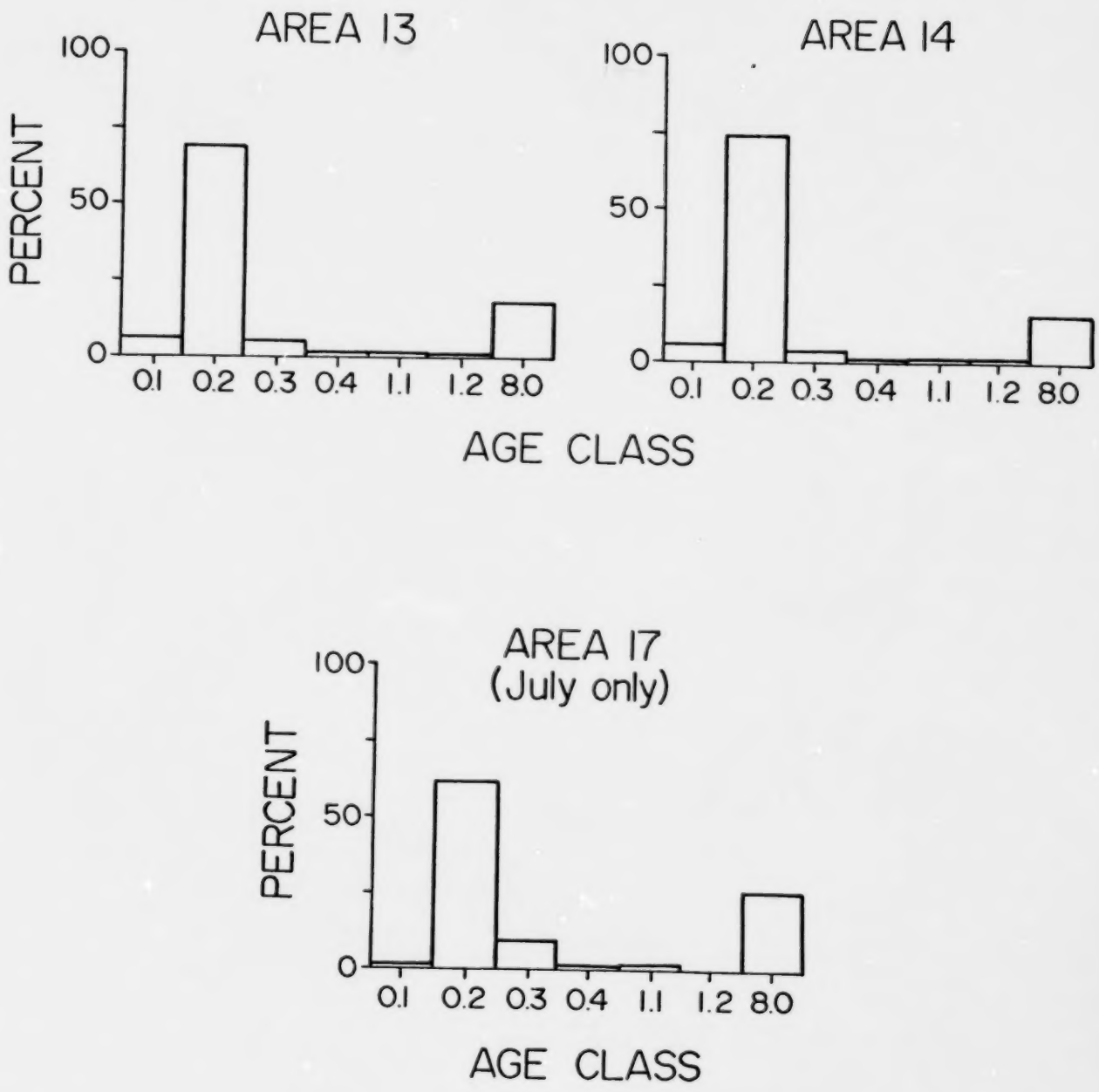


Fig. 9. Age composition by area for 1984 Strait of Georgia troll-caught chinook.

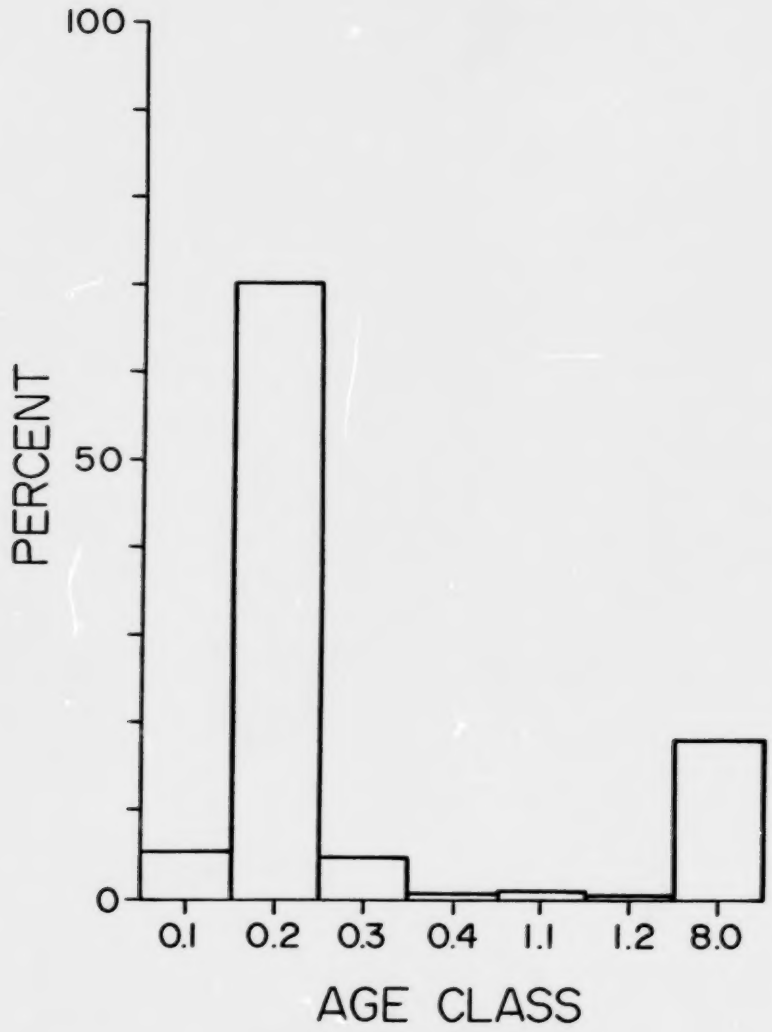


Fig. 10. Age composition of 1984 Strait of Georgia troll-caught chinook-combined areas.

(0.1) is evident. The mean length at each age was longer in the northern areas but overall the mean length at age is as follows: 0.1 - 519 mm, 0.2 - 636 mm, 0.3 - 788 mm, 0.4 - 783 mm, 1.1 - 544 mm, 1.2 - 675 mm. Unlike 1983, there were no age 1.3 and only 0.3 percent of age 0.4. Table 10 and Figures 9 and 10 give summaries of age composition by area. Mean length at age by area is shown in Table 11.

When comparing to 1983, the pattern is similar with a greater percentage of 2-year olds, but the ratio of 2-year olds to other ages was less in 1983 than in 1984 (Table 12).

ACKNOWLEDGMENTS

The authors would like to acknowledge the efforts of the summer students from Malaspina College and employees of J. E. Sager and Associates for their parts in the collection and handling of the data. We also thank the ageing unit of the Pacific Biological Station for the age determination and, above all, the commercial salmon trollers in the Strait of Georgia for their tremendous cooperation in supplying the information.

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Table 11. Mean length (mm) at age[a] for 1984 Strait of Georgia troll-caught chinook

Area		Age 0.1	0.2	0.3	0.4	1.1	1.2	8.0[b]	Total
13	n	9	272	24	1	2	-	64	372
July	$\bar{x}$	499	646	803	880	495		642	652
	%	2.4	73.1	6.5	0.3	0.5		17.2	100.0
	n	39	235	16	2	1	1	66	360
August	$\bar{x}$	518	651	796	685	550	770	661	645
	%	10.8	65.3	4.4	0.6	0.3	0.3	18.3	100.0
14	n	16	382	18	1	1	2	86	506
July	$\bar{x}$	516	632	781	770	590	630	617	631
	%	3.2	75.5	3.5	0.2	0.2	0.4	17.0	100.0
	n	22	102	1	-	1	-	21	147
August	$\bar{x}$	533	631	750		580		606	613
	%	15.0	69.4	0.7		0.7		14.2	100.0
17	n	1	109	16	1	2	-	47	176
July	$\bar{x}$	520	628	768	890	550		623	639
	%	0.6	61.9	9.1	0.6	1.1		26.7	100.0
29	n	-	-	-	-	-	-	1	1
August	$\bar{x}$							480	480
	%							100.0	100.0
Combined	n	26	763	58	3	5	2	197	1054
July	$\bar{x}$	510	636	787	847	536	630	627	640
	%	2.4	72.4	5.5	0.3	0.5	0.2	18.7	100.0
	n	61	337	17	2	2	1	88	508
August	$\bar{x}$	523	645	793	685	565	770	646	636
	%	12.0	66.3	3.4	0.4	0.4	0.2	17.3	100.0
	n	87	1100	75	5	7	3	285	1562
Total	$\bar{x}$	519	639	788	782	544	677	633	638
	%	5.6	70.5	4.8	0.3	0.4	0.2	18.2	100.0

[a]Ages used are from Total and Random catch samples only.

[b]8.0 = Scales unreadable or no scale sample taken.

Table 12. Age Composition[a] by area comparison between 1983 and 1984 Strait of Georgia troll-caught chinook.

		1983		1984	
Area	Age	Catch	Percent	Catch	Percent
13	0.1	70	2.8	48	6.5
	0.2	1148	46.3	507	69.3
	0.3	534	21.6	40	5.5
	0.4	21	0.9	3	0.4
	1.1	15	0.6	3	0.4
	1.2	26	1.0	1	0.1
	1.3	18	0.7	0	-
	8.0[b]	647	26.1	130	17.8
14	0.1	257	8.8	38	5.8
	0.2	1737	59.4	484	74.1
	0.3	434	14.8	19	2.9
	0.4	11	0.4	1	0.2
	1.1	11	0.4	2	0.3
	1.2	13	0.4	2	0.3
	1.3	3	0.1	0	-
	8.0	459	15.7	107	16.4
16	0.1	16	4.0	0	-
	0.2	193	48.0	0	-
	0.3	94	23.4	0	-
	0.4	2	0.5	0	-
	1.1	4	1.0	0	-
	1.2	8	2.0	0	-
	8.0	85	21.1	0	-
17	0.1	39	1.5	1	0.6
	0.2	1870	72.8	109	61.9
	0.3	250	9.7	16	9.1
	0.4	6	0.2	1	0.6
	1.1	9	0.4	2	1.1
	1.2	15	0.6	0	-
	1.3	6	0.2	0	-
	8.0	376	14.6	47	26.7
18	0.2	39	36.1	0	-
	0.3	36	33.4	0	-
	0.4	1	0.9	0	-
	1.1	1	0.9	0	-
	1.2	3	2.8	0	-
	1.3	1	0.9	0	-
	8.0	27	25.0	0	-

Table 12 (cont'd)

Area	Age	1983 Catch	1983 Percent	1984 Catch	1984 Percent
29	0.1	10	4.3	0	-
	0.2	168	71.5	0	-
	0.3	21	9.0	0	-
	0.4	1	0.4	0	-
	1.1	1	0.4	0	-
	1.2	1	0.4	0	-
	8.0	33	14.0	1	100.0
Combined	0.1	392	4.5	87	5.6
	0.2	5155	59.1	1100	70.4
	0.3	1369	15.7	75	4.8
	0.4	42	0.5	5	0.3
	1.1	41	0.5	7	0.5
	1.2	66	0.7	3	0.2
	1.3	28	0.3	0	-
	8.0	1627	18.7	285	18.2

[a]Ages used are from Total and Random catch samples only.

[b]8.0 = scales unreadable or no scale sample taken.

Appendix A

1984 Port Sampling Manual

Pacific Biological Station

Nanaimo, British Columbia

March 1983

Contact Personnel

CONTACT PERSONNEL

	Phone
Louis Lapi, Project Biologist	
Pacific Biological Station.	756-7144
Home.	245-2823
Bob Ball, Project Technician	
Pacific Biological Station.	756-7246
Home.	753-3687
Ted Carter, Project Technician	
Pacific Biological Station.	756-7252
Home.	468-9247
Pacific Biological Station.	756-7000

After station hours (08:00-16:15) call Louis, Bob, or Ted collect.

INTRODUCTION

The salmon sampling program was designed to sample the commercial troll catch of chinook and coho salmon in the Gulf of Georgia for biological data and catch data. The biological data will provide information necessary in the management and enhancement of salmonids while the catch data will give an indication of catch per unit of effort. The overall goal of the program is to sample between 7 and 10 percent of the commercial catch of chinook and coho in addition to interviewing the fishing vessels for catch and effort information.

The purpose of this manual is to:

1. Provide the sampler with a general overview of the sampling program.

2. Provide the sampler with a detailed, easy-to-follow guide to biological sampling procedures to ensure a standard method of collection of data.

3. Provide the sampler with a reference to help in any problems he/she may encounter.

The success of this program depends largely on the accuracy and precision of the sampling by the field personnel. Please use this manual as a

reference but do not hesitate to phone one of the contact personnel if problems arise (Page 30).

1. COMMERCIAL SAMPLING

Table 1 outlines the sampling locations which will be covered by each major headquarters. Sampling will provide the basic data required to identify the origin and establish the age/size composition of chinook and coho salmon occupying diverse geographic locations.

At each location, samplers will work closely with plant personnel in order to obtain random catch samples for biological sampling data. Catches may arrive by packers, individual troll vessels, and trucks. Samples will be taken as the fish are being graded by species or into various size and color categories. Preference must be given to landings from individual vessels with catches which originate from a single catch location. Therefore, prior to taking a sample, the sampler must first interview the vessel skipper to obtain the necessary information. At some locations (e.g. Nanaimo Harbour) where a buyer is not always available, interviews and sampling will take place aboard each vesel once permission has been granted by the skipper.

Table 1. Sampling locations covered by major headquarters.

Headquarters	Locations covered
Campbell River	Campbell River Quadra Island
Courtenay	Courtenay Comox
Parksville	Deep Bay French Creek
Nanaimo	Nanaimo Gabriola Island Cowichan Sidney (possible)

2. INTERVIEW PROCEDURES

A brief interview with the skipper of each vessel is necessary to obtain the most accurate information on catch location and trip duration (mainly day boats). Although brief, these interviews are important so the interviewer should express interest in details of the fisherman's trip and be prepared to answer any questions regarding salmon biology (if possible). Generally, the more interest expressed by the interviewer will result in greater cooperation by the skipper.

The catch information and areas fished are crucial and should be obtained to as accurate a degree as possible. In the case where a boat has fished in more than one location, an estimate of time spent or number of fish caught by locality is important and samples taken should be coded accordingly. If greater than 90 percent of the catch is from one location then this can be regarded as being from one area. If you are not familiar with the areas the fishermen is discussing, refer to the chart provided and have the fishermen point out the location. All catch information (trip length and fishing locations) and comments will be recorded on the interview forms (see example). The section reserved for sales slip number should now be used for the gear type code, until new forms have been issued.

Interview forms are designed to handle fishing trips of up to three days duration. If a boat has had a trip greater than three days, then

continue the interview on the next form and renumber that form to correspond with the first page of the interview. Forms should be used in numerical order.

Important: All of these data are strictly confidential and should not be discussed with anyone.

2.1 Personal Diary (red books)

At the beginning of the season it is advisable to use this book to record the name, CFV, and skipper of each vessel interviewed to help familiarize yourself with each. This will undoubtedly benefit you in subsequent interviews. In addition, this book should be used as a personal record of daily activities, including the number of vessels interviewed, and the total number of fish sampled by species by vessel.

2.2 Daily and Weekly Summary Forms

Daily and weekly summaries must be completed at each sampling location. Data will be picked up each Monday or arrangements must be made to bring them to the Pacific Biological Station. Constant communication will occur between sample locations and supervisors in regards to sampling strategies. Area priorities will alter over time, based on fleet distribution and the accumulated sample data from an area. When filling out these forms, please adhere to the system already established unless otherwise instructed.

Again emphasis is on consistency, neatness, and clarity. Both daily and weekly summaries will be completed using the same information which is as follows (see example):

A. Record by area

I. Record by species

a. Total number landed and total weight (kilograms) by grade

b. Total number sampled and total weight by grade

c. Percent sampled

d. Corresponding scale book numbers

II. Number of vessels sampled

3. DATA PROCESSING CENTER

The data processing will be done at the Pacific Biological Station in Nanaimo. All the data which the samplers will be recording will be entered onto the computer system for storage and analyses. All data must be submitted to the supervisor.

4. BIOLOGICAL SAMPLING

Biological sampling will involve taking fork length or orbital-hypural measurements, weights, and scales from chinook and sockeye only . Data collected from other species will include only length and weight (i.e. no scale) and all species must be recorded on separate biological sample forms.

In an attempt to conserve on the use of sample forms, we request that if you have a small sample from one vessel, that you continue the next sample on the same biological sample form (for the same species). By doing this, the interview number of the second sample must be written in the appropriate space beside the first line of data for that sample. In such a situation, the name of the vessel for the second and subsequent samples must be written in the comments also beside the first line of data for that sample. This situation will also involve continuous use of the scale book and to help keep the data straight, the names of the vessels and CFV's should be written in order in the space on the reverse side of the scale book.

IMPORTANT: If a scale sample is unavailable from a fish, be sure to skip that space on the scale card and continue the scale samples in the next available space. In other words do not put scales from fish No. 10 on scale space No.9.

The following summary will outline the sequence of data gathering required to provide the most detailed sample information.

A. Set up a work area which should include:

I. Table or work platform

II. Tweezers

III. Hand-tally counters

IV. Clip-board with supply of sampling forms

V. Scale books

VI. Kilogram scale

VII. Fork and orbital-hypural length measuring boards

B. Where possible, the entire catch of a vessel should be sampled. In cases where this is impossible, a minimum of 25 fish in each grade must be sampled. If time is a restricting factor, concentrate on sampling the larger grades which represent more year classes.

C. Processing each salmon involves accurately measuring and recording the following data on the biological sample form (see example):

I. Date ----------

II. Sample location (name) at

III. Vessel top

IV. Sampler's name of

V. Recorder's name page

VI. Sample type (1, 2, 3, or 9)

VII. Date and statistical week sampled

VIII. Sample location

IX. Catch area and location (stat area and sub-area or locality - refer to charts provided

X. Species

XI. Gear type

XII. Fork length or orbital-hypural length (in mm) and length code

XIII. Obtain two scales (one from each side on preferred area, see Figure 1) ***Scales must all be placed the same way on the scale book*** Use scale books in numerical order, record scale book number

XIV. Weight in kilograms to nearest (0.1 kg)

XV. Round or dressed condition of fish

XVI. Grade designation (color, quality, and weight determine grade)

XVII. Interview number

For the above categories, samplers are referred to the list of codes on pages 7 and 8.

D. Keep a record of all fish and a separate count of any marked (fin-clipped) fish by grade and species.

Those samplers working aboard packers in Areas 17 and 18 only will have the additional responsibility of enumerating and processing fish with a

missing adipose fin. These fish have a coded wire tag (CWT) implanted in their nose and should be processed using basically the same method as unmarked fish.

First, remove each fish missing an adipose fin from each grade after the tote or bin has been weighed, keeping track of the total number observed and the total number marked. A coded disc tag must then be attached to the operculum (in the case of total head removal) and the fish's biological data recorded with the appropriate disc tag number in the comments section. The marked fish data must be recorded on a separate biological sample form and coded as disc-tagged fish (see biological sample codes).

Once all the information is recorded and disc tag attached, remove the fish's head by one of the two freezer cut methods according to the company's preference. The first method involves removing the whole head by cutting from the edge of the operculum forward and coming out approximately 2 cm behind the eyes. This cut should essentially bisect the brain and leave a wedge of cartiledge which will protect the meat from drying, etc. The second method involves removing only the top snout by cutting straight down from approximately 1 cm behind eye. This may be the preferred cut (and the easier) in most cases. In this case attach the disc tag to the snout in a cartilaginous area. Heads will be stored in buckets or waxed biological sample boxes by separate catch region.

There will be someone to give a demonstration on the two cutting methods prior to the opening of the season.

Biological Sample Codes

Column		Data
01	Sample type	*1-total catch sample 2-random catch sample-fish randomly selected from each grade 3-partial catch sample-a biased sample selecting for larger fish 9-unknown-explain (eg. did not interview skipper
02-07	Date (YYMMDD)	
08-10	Statistical week	-refer to stat week table (Page 9)
11	Week code	*1-sampled same week as caught
12	Sampling location code	A-any observer trip (ie. packer, troll vessel, cash buyer, etc.) 1-Campbell River 2-Quadra Island 3-Courtenay 4-Deep Bay 5-French Creek 6-Nanaimo 7-Silva Bay 8-Cowichan 9-Sidney 0-Victoria
13-14	Catch Region	*04-Georgia Strait troll
15-17	Statistical area	-refer to chart
18-20	Sub-area	-refer to chart (code or name)
21-23	Species	108-Pink 112-Chum *115-Coho 118-Sockeye *124-Chinook
24-25	Gear	10-Gillnet 15-General net 20-Seine 30-Troll (general) 31-Troll (freezer boat) *32-Troll (day camp boat) 33-Troll (ice boat)

Biological Sample Codes (cont'd)

Column		Data
26-29	Length (millimetres)	
30	Length code	*1-Fork
		2-Orbital/Hypural
		3-Total
31-34	Scale book no.	-Number on scalebook
35-36	Scale no.	01-25
37-39	Weight (kilograms)	
40		1-Round
		*2-Dressed
41	Sex	1-Male
		2-Female
		*3-Unknown
42-43	Coded Pin Mark	01-Adipose only
		07-Adipose/left ventral
		08-Right ventral
		09-Left ventral
		10-Adipose/right ventral
		11-Adipose/left pectoral
		12-Adipose/right pectoral
		33-Adipose (stubby)
		34-1/2 dorsal
44	Freshwater age	
45	Saltwater age	
46	Color code	1-red
		2-white
47	Quality	*1-fresh
		2-cannery
48-49	Grade	Chinook:
		01-red-large (>5.4 kg)
		02-red-medium (3.6-5.4 kg)
		03-red-small (<3.6 kg)
		08-white-all sizes
		Coho:
		-ungraded
50-53	Interview number	
54-63	Comments	

* refers to most commonly used codes.

Statistical Week Codes

Period	Week Code
Apr. 15 - Apr. 21	043
Apr. 22 - Apr. 28	044
Apr. 29 - May 5	045
May 6 - May 12	051
May 13 - May 19	052
May 20 - May 26	053
May 27 - June 2	054
June 3 - June 9	061
June 10 - June 16	062
June 17 - June 23	063
June 24 - June 30	064
July 1 - July 7	071
July 8 - July 14	072
July 15 - July 21	073
July 22 - July 28	074
July 29 - Aug. 4	075
Aug. 5 - Aug. 11	081
Aug. 12 - Aug. 18	082
Aug. 19 - Aug. 25	083
Aug. 26 - Sept. 1	084
Sept. 2 - Sept. 8	091
Sept. 9 - Sept.15	092
Sept.16 - Sept.22	093
Sept.23 - Sept.29	094
Sept.30 - Oct. 6	101

5. PLANT PROCEDURES

Each plant or buying camp provides the sampler with a unique work situation and samplers must therefore conform to the procedures of each plant/camp when obtaining a sample. Sampling personnel are guests in these plants and should act accordingly.

Sampling personnel will deal with more people in the fishing industry than anyone else in the Department of Fisheries and Oceans. These people will derive their opinion of the Department from what they observe from samplers in this program. Public relations is one of the best tools in getting cooperation from people in the industry. Rules of individual plants must be adhered to, as deliberately ignoring them may seriously jeopardize relations between the plant and the Department. If, for some reason, rules prohibit the selection of an adequate sample or prevent the sampler from completing his/her duties, then the supervisor should be notified immediately.

In an effort to keep the system running as smoothly as possible, the following instructions must be adhered to at all locations:

A. Do not argue with, or in any way antagonize the buying station management or staff.

B. Do not get involved with weighing fish or writing fish slips for a company. If a mistake occurs (and they often do) the blame could fall on the sampler.

C. If a sampler is offered employment at one of the plants, and wishes to accept, the supervisor must be notified immediately.

D. Learn how to handle the fish properly in compliance with company procedure. Do not throw or abuse the fish in any way. Troll fish are often destined for the fresh fish market and their appearance and condition affects their value. At no time should a fish be picked up by the tail as this causes separation of the flesh from the spinal column.

E. Do not smoke in the plant. It is against both plant and health regulations.

F. At no time should samplers be standing idle at the plants. Any number of small tasks can be undertaken during slow times such as; pre-numbering sample forms, putting headings in the field notebook, or completing daily or weekly summaries. This not only keeps you busy but will speed up the operation when the sampling gets heavy.

G. Samplers must keep sampling area and equipment clean.

H. It is the responsibility of each sampler to report for work daily. If, for some reason, he/she is unable to report to work, then that person must contact the supervisor explaining the situation.

I. If in doubt, ask the supervisor for guidance in any of the above circumstances.

6. PERSONAL GEAR

In addition to personal clothing, samplers with require certain other articles which are supplied. The following is a list of of personal gear required:

A. Raingear (hooded jacket and pants)

B. Rubber boots

C. I.D. card (name, photo, position title)

Each sampler will be issued a sampling kit containing the following:

A. Tweezers/Forceps

B. Measuring Boards

C. Plastic measuring sticks (orbital-hypural)

D. Kilogram scales

E. Hand-tally counters

F. Knives

G. Disc tags (for packer samplers only)

H. Gloves (Marigolds - small, medium, large)

I. Plastic bags (for unusual specimens)

J. Folding table

K. Charts

L. Stationary

I. Conversion tables (metric/imperial, dressed/round, etc.)

II. Biological sample forms

III. Scale books

IV. Field notebooks (waterproof diary)

V. Little red books (personal diary, travel, expenses, etc.)

VI. Interview questionaires

VII. Daily/weekly summary forms

VIII. Note pads

IX. Manilla folders

X. Clipboards (scale book and sample sheet size)

XI. Pencils, felt pens (small and large)

XII. Erasers

XIII. Elastics

XIV. Rulers

XV. Stapler/Staples

XVI. Tape (scotch, fibre)

XVII. Hart (Pacific Fishes of Canada)

XVIII. Sampling manual

Samplers will be responsible for their own kit and must keep track of the number of forms, scale books, etc. they have so more can be ordered as they are needed.

7. SALMON SPECIES IDENTIFICATION

Although we are concerned only with sampling chinook and coho, there may be the occasion when it is difficult to differentiate between any of the five species. For this reason, a guide has been made to help identify all five species using external features and listing them in order of importance. Generally, any salmonid weighing 11.3 kg (25 lb) or more and caught off the B.C. coast is likely to be a chinook, however, five equally-sized samples from all species could create a problem. Please use the following guide:

Chinook salmon (also called; spring, blackmouth, king, tyee, smiley):

1. Teeth grow out of a black (at times gray) gum line.
2. Large black spots appear on the back and in the cartilage between fin rays on both lobes of caudal fin.
3. Attains large size - to 45.4 kg (100 lb).
4. Narrow caudal peduncle.
5. A strong pungent odour, unmistakable once recognized.

Coho salmon (also called; silver, hooknose, blueback):

1. Teeth protrude from a white gum line.
2. Few small spots on back and in cartilage between fin rays on upper lobe only of caudal fin.
3. The first ray of a depressed anal fin will reach beyond the midpoint of the fin base.
4. Wide caudal peduncle.
5. Small bluish dots on the collar of the "neck".

Pink salmon (also called; humpback, humpy):

1. Large, oval, opaque spots in cartilage between fin rays on both lobes of caudal fin.
2. Numerous, small scales.
3. Small fish (to 3.2 kg - 7 lb).
4. Develop exaggerated humps as spawning approaches.

Sockeye salmon (also called; red, sox):

1. Dull, gray tail - no spots, 1 to 3.6 kg (2 to 8 lb).
2. No spots on back, contrasting blue/green back and silver sides.
3. Thin, straight maxillary.
4. Large eye pupil.

Chum salmon (also called; dog, keta, quala):

1. Similar to a coho but average larger in size (7 to 20 kg - 15 to 44 lb).
2. No spotting on back or tail.
3. Caudal peduncle small and almost round.
4. Maxillary thin and straight. Does not hook down as obviously as coho maxillary.
5. Distinctive "parr" markings on the sides.

Steelhead (also called; rainbow trout):

1. Square tail, olive-green in colour, covered with small dots.
2. Thick, square caudal peduncle.
3. Red stripe or band follows lateral line from operculum to tail.

Appendix table B. Length/frequency by color, month, and area for 1984 Strait of Georgia troll-caught chinook.

Area	Month	Length interval (mm)	Number red	Number white	Total
13	July	440-459	1	0	1
		460-479	9	0	9
		480-499	19	1	20
		500-519	13	0	13
		520-539	22	2	24
		540-559	45	1	46
		560-579	58	4	62
		580-599	78	8	86
		600-619	129	10	139
		620-639	130	17	147
		640-659	127	24	151
		660-679	121	30	151
		680-699	85	22	107
		700-719	57	31	88
		720-739	55	26	81
		740-759	40	30	70
		760-779	36	35	71
		780-799	9	24	33
		800-819	17	20	37
		820-839	11	11	22
		840-859	10	7	17
		860-879	2	9	11
		880-899	2	7	9
		900-919	1	0	1
		920-939	2	2	4
		940-959	1	1	2
		Month Total	1080	322	1402

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
13 (cont'd)	August	460-479	1	0	1
		480-499	4	0	4
		500-519	6	0	6
		520-539	3	0	3
		540-559	5	0	5
		560-579	0	1	1
		580-599	8	1	9
		600-619	13	3	16
		620-639	13	2	15
		640-659	15	3	18
		660-679	10	1	11
		680-699	6	4	10
		700-719	6	2	8
		720-739	4	2	6
		740-759	0	3	3
		760-779	1	3	4
		780-799	0	3	3
		800-819	1	1	2
		820-839	0	1	1
		840-859	0	1	1
		860-879	0	0	0
		880-899	0	1	1
		Month Total	96	32	128
		Area Total	1176	354	1530

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
14	July	480-499	5	1	6
		500-519	9	1	10
		520-539	16	3	19
		540-559	29	3	32
		560-579	52	3	55
		580-599	61	5	66
		600-619	74	13	87
		620-639	50	13	63
		640-659	60	10	70
		660-679	32	13	45
		680-699	23	7	30
		700-719	19	5	24
		720-739	19	8	27
		740-759	8	11	19
		760-779	9	3	12
		780-799	1	2	3
		800-819	2	1	3
		820-839	3	0	3
		840-859	1	2	3
		860-879	0	2	2
		880-899	1	1	2
		900-919	0	1	1
		920-939	0	0	0
		940-959	0	1	1
		Month Total	474	109	583

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
14 (cont'd)	August	480-499	3	0	3
		500-519	8	0	8
		520-539	14	2	16
		540-559	5	0	5
		560-579	5	1	6
		580-599	14	0	14
		600-619	14	1	15
		620-639	20	2	22
		640-659	25	9	34
		660-679	18	2	20
		680-699	12	4	16
		700-719	8	6	14
		720-739	5	2	7
		740-759	4	7	11
		760-779	6	2	8
		780-799	0	2	2
		800-819	0	0	0
		820-839	1	0	1
		840-859	1	0	1
		860-879	0	0	0
		880-899	1	0	1
		Month Total	164	40	204
		Area Total	638	149	787

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
16	July	600-619	1	0	1
		620-639	1	0	1
		640-659	1	0	1
		660-679	0	0	0
		680-699	1	0	1
		700-719	0	0	0
		720-739	2	0	2
		740-759	2	0	2
		760-779	1	1	2
		780-799	0	0	0
		800-819	1	0	1
		820-839	0	0	0
		840-859	0	0	0
		860-879	1	0	1
		Area Total	11	1	12

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
17	July	500-519	1	0	1
		520-539	8	0	8
		540-559	15	1	16
		560-579	20	1	21
		580-599	16	6	22
		600-619	14	6	20
		620-639	12	4	16
		640-659	12	2	14
		660-679	6	3	9
		680-699	11	3	14
		700-719	6	6	12
		720-739	5	5	10
		740-759	1	2	3
		760-779	2	3	5
		780-799	3	1	4
		800-819	1	1	2
		820-839	1	2	3
		840-859	0	1	1
		860-879	0	1	1
		880-899	0	1	1
		Area Total	135	49	184
29	July	480-499	1	0	1
		Area Total	1	0	1

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
Combined	July	440-459	1	0	1
		460-479	9	0	9
		480-499	25	2	27
		500-519	23	1	24
		520-539	46	5	51
		540-559	89	5	94
		560-579	130	8	138
		580-599	155	19	174
		600-619	218	29	247
		620-639	193	34	227
		640-659	200	36	236
		660-679	159	46	205
		680-699	120	32	152
		700-719	82	42	124
		720-739	81	39	120
		740-759	51	43	94
		760-779	48	42	90
		780-799	14	27	41
		800-819	21	22	43
		820-839	15	13	28
		840-859	11	10	21
		860-879	3	12	15
		880-899	3	9	12
		900-919	1	1	2
		920-939	2	2	4
		940-959	1	2	3
		Month Total	1701	481	2182

Appendix table B (cont'd)

Area	Month	Length interval (mm)	Number red	Number white	Total
Combined (cont'd)	August	460-479	1	0	1
		480-499	7	0	7
		500-519	14	0	14
		520-539	17	2	19
		540-559	10	0	10
		560-579	5	2	7
		580-599	22	1	23
		600-619	27	4	31
		620-639	33	4	37
		640-659	40	12	52
		660-679	28	3	31
		680-699	18	8	26
		700-719	14	8	22
		720-739	9	4	13
		740-759	4	10	14
		760-779	7	5	12
		780-799	0	5	5
		800-819	1	1	2
		820-839	1	1	2
		840-859	1	1	2
		860-879	0	0	0
		880-899	1	1	2
		Month Total	260	72	332
		Grand Total	1961	553	2514

Appendix table C. Weight/frequency by color, month and area for 1984 Strait of Georgia troll-caught chinook.

Area	Month	Weight interval (kg)	Number red	Number white	Total
13	July	1.0-1.9	150	5	155
		2.0-2.9	432	50	482
		3.0-3.9	273	73	346
		4.0-4.9	125	67	192
		5.0-5.9	63	82	145
		6.0-6.9	26	19	45
		7.0-7.9	7	21	28
		8.0-8.9	4	5	9
		Month Total	1080	322	1402
	August	1.0-1.9	20	0	20
		2.0-2.9	37	8	45
		3.0-3.9	32	7	39
		4.0-4.9	6	4	10
		5.0-5.9	0	6	6
		6.0-6.9	1	6	7
		7.0-7.9	0	1	1
		Month Total	96	32	128
		Area Total	1176	354	1530

Appendix table C (cont'd)

Area	Month	Weight interval (kg)	Number red	Number white	Total
14	July	1.0-1.9	70	9	79
		2.0-2.9	248	33	281
		3.0-3.9	98	29	127
		4.0-4.9	41	22	63
		5.0-5.9	10	9	19
		6.0-6.9	6	1	7
		7.0-7.9	0	4	4
		8.0-8.9	0	2	2
		9.0-9.9	1	0	1
			474	109	583
	August	1.0-1.9	26	1	27
		2.0-2.9	52	3	55
		3.0-3.9	59	14	73
		4.0-4.9	17	11	28
		5.0-5.9	5	9	14
		6.0-6.9	3	2	5
		7.0-7.9	2	0	2
		Month Total	164	40	204
		Area Total	638	149	787

Appendix table C (cont'd)

Area	Month	Weight interval (kg)	Number red	Number white	Total
16	July	2.0-2.9	1	0	1
		3.0-3.9	2	0	2
		4.0-4.9	1	0	1
		5.0-5.9	5	1	6
		6.0-6.9	1	0	1
		7.0-7.9	0	0	0
		8.0-8.9	1	0	1
		Area Total	11	1	12
17	July	1.0-1.9	16	3	19
		2.0-2.9	69	12	81
		3.0-3.9	27	11	38
		4.0-4.9	17	11	28
		5.0-5.9	6	5	11
		6.0-6.9	0	4	4
		7.0-7.9	0	3	3
		Area Total	135	49	184
29	July	1.0-1.9	1	0	1
		Area Total	1	0	1
Combined	July	1.0-1.9	237	17	254
		2.0-2.9	750	95	845
		3.0-3.9	400	113	513
		4.0-4.9	184	100	284
		5.0-5.9	84	97	181
		6.0-6.9	33	24	57
		7.0-7.9	7	28	35
		8.0-8.9	5	7	12
		9.0.9.9	1	0	1
		Month Total	1701	481	2182
	August	1.0-1.9	46	1	47
		2.0-2.9	89	11	100
		3.0-3.9	91	21	112
		4.0-4.9	23	15	38
		5.0-5.9	5	15	20
		6.0-6.9	4	8	12
		7.0-7.9	2	1	3
		Month Total	260	72	332
		Grand Total	1961	553	2514

Appendix table D. Length/frequency by month and area for 1984 Strait of Georgia troll-caught coho.

Area	Month	Length Interval (mm)	Frequency
13	July	400-419	1
		420-439	3
		440-459	4
		460-479	23
		480-499	31
		500-519	56
		520-539	97
		540-559	135
		560-579	106
		580-599	47
		600-619	15
		620-639	2
		640-659	2
		660-679	1
		680-699	2
		700-719	1
		Month Total	526
	August	400-419	0
		420-439	0
		440-459	1
		460-479	1
		480-499	3
		500-519	7
		520-539	7
		540-559	12
		560-579	16
		580-599	11
		600-619	10
		620-639	2
		Month Total	70
		Area Total	596

Appendix table D (cont'd)

Area	Month	Length interval (mm)	Frequency
14	July	360-379	1
		380-399	6
		400-419	17
		420-439	30
		440-459	69
		460-479	108
		480-499	160
		500-519	216
		520-539	342
		540-559	326
		560-579	192
		580-599	56
		600-619	17
		620-639	6
		640-659	6
		660-679	3
		680-699	2
		700-719	1
		720-739	1
		740-759	0
		760-779	0
		780-799	1
		Month Total	1560

Appendix table D (cont'd)

Area	Month	Length interval (mm)	Frequency
	August	340-359	1
		360-379	0
		380-399	3
		400-419	4
		420-439	13
		440-459	24
		460-479	19
		480-499	44
		500-519	53
		520-539	60
		540-559	117
		560-579	98
		580-599	56
		600-619	19
		620-639	4
		640-659	1
		660-679	1
		680-699	1
		700-719	0
		720-739	0
		740-759	1
		Month Total	519
		Area Total	2079

Appendix table D (cont'd)

Area	Month	Length interval (mm)	Frequency
16	July	580-599	1
		Area Total	1
Combined	July	360-379	1
		380-399	6
		400-419	19
		420-439	35
		440-459	79
		460-479	136
		480-499	196
		500-519	279
		520-539	445
		540-559	466
		560-579	298
		580-599	104
		600-619	32
		620-639	8
		640-659	8
		660-679	4
		680-699	4
		700-719	2
		720-739	1
		740-759	0
		760-779	0
		780-799	1
		Month Total	2124

Appendix table D (cont'd)

Area	Month	Length interval (mm)	Frequency
Combined	August	340-359	1
		360-379	0
		380-399	3
		400-419	4
		420-439	13
		440-459	25
		460-479	20
		480-499	47
		500-519	60
		520-539	67
		540-559	129
		560-579	114
		580-599	67
		600-619	29
		620-639	6
		640-659	1
		660-679	1
		680-699	1
		700-719	0
		720-739	0
		740-759	1
		Month Total	589
		Grand Total	2713

Appendix table E. Weight/frequency by month and area for 1984 Strait of Georgia troll-caught coho.

Area	Month	Weight Interval (kg)	Frequency
13	July	0.0-0.9	31
		1.0-1.9	457
		2.0-2.9	34
		3.0-3.9	4
		Month Total	526
	August	0.0-0.9	1
		1.0-1.9	49
		2.0-2.9	20
		Month Total	70
		Area Total	596
14	July	0.0-0.9	93
		1.0-1.9	1388
		2.0-2.9	77
		3.0-3.9	2
		Month Total	1560
	August	0.0-0.9	24
		1.0-1.9	389
		2.0-2.9	100
		3.0-3.9	5
		4.0-4.9	0
		5.0-5.9	1
		Month Total	519
		Area Total	2079
16	July	2.0-2.9	1
		Area Total	1

Appendix table E (cont'd)

Area	Month	Weight Interval (kg)	Frequency
17	July	0.0-0.9	3
		1.0-1.9	34
		Area Total	37
Combined	July	0.0-0.9	127
		1.0-1.9	1879
		2.0-2.9	112
		3.0-3.9	6
		Month Total	2124
	August	0.0-0.9	25
		1.0-1.9	438
		2.0-2.9	120
		3.0-3.9	5
		4.0-4.9	0
		5.0-5.9	1
		Month Total	589
		Total	2713